Technical Disclosure Commons

Defensive Publications Series

September 2021

SYSTEM AND METHOD FOR ALERTING AND DECISIONING CARBON FOOTPRINT IN REAL TIME BASED ON TRANSACTION DATA

Navendu Misra
Visa

Praveen Guggarigoudar
Visa

Darshak Shah
Visa

SYSTEM AND METHOD FOR ALERTING AND DECISIONING CARBON FOOTPRINT IN REAL TIME BASED ON TRANSACTION DATA

VISA

INVENTOR:

NAVENDU MISRA

PRAVEEN GUGGARIGOUDAR

DARSHAK SHAH

TECHNICAL FIELD

[0001] This disclosure relates to real time carbon footprint alerting and decisioning by transaction data.

BACKGROUND

[0002] Carbon footprint is a key component for daily life. As people are moving towards greener and carbon conscious living there is a demand for financial products to deliver carbon conscious solutions. There are other solutions from financial services companies that provide a generalized approach to determining carbon impact. These solutions however are too general (carbon offset calculated by total amount spend) and do not help customers make informed decisions using real-time transaction processing. Today people are more aware of their carbon impact and there is a strong business need for carbon analysis products.

BRIEF DESCRIPTION OF THE DRAWINGS

[0003] Additional advantages and details are explained in greater detail below with reference to the exemplary embodiments that are illustrated in the accompanying schematic figures, in which:

[0004] Fig. 1a illustrates a block diagram of a system for implementing embodiments consistent with the present disclosure.

[0005] Fig. 1b exemplifies the process of determing aggregate carbon footprint.

[0006] Fig. 2 shows a flowchart illustrating a process for determining cardholder's carbon footprint based on transaction data.

[0007] Fig. 3 illustrates a block diagram of an exemplary computer system for implementing embodiments consistent with the present disclosure.

DESCRIPTION OF THE DISCLOSURE

[0008] It is to be understood that the present disclosure may assume various alternative variations and step sequences, except where expressly specified to the contrary. It is also to be

understood that the specific devices and processes illustrated in the attached drawings and described in the following specification are simply exemplary and non-limiting embodiments or aspects. Hence, specific dimensions and other physical characteristics related to the embodiments or aspects disclosed herein are not to be considered as limiting.

[0009] For purposes of the description hereinafter, the terms “end,” “upper,” “lower,” “right,” “left,” “vertical,” “horizontal,” “top,” “bottom,” “lateral,” “longitudinal,” and derivatives thereof shall relate to the disclosed subject matter as it is oriented in the drawing figures. However, it is to be understood that the disclosed subject matter may assume various alternative variations and step sequences, except where expressly specified to the contrary. It is also to be understood that the specific devices and processes illustrated in the attached drawings, and described in the following specification, are simply exemplary embodiments or aspects of the disclosed subject matter. Hence, specific dimensions and other physical characteristics related to the embodiments or aspects disclosed herein are not to be considered as limiting unless otherwise indicated.

[0010] No aspect, component, element, structure, act, step, function, instruction, and/or the like used herein should be construed as critical or essential unless explicitly described as such. Also, as used herein, the articles “a” and “an” are intended to include one or more items and may be used interchangeably with “one or more” and “at least one.” Furthermore, as used herein, the term “set” is intended to include one or more items (e.g., related items, unrelated items, a combination of related and unrelated items, and/or the like) and may be used interchangeably with “one or more” or “at least one.” Where only one item is intended, the term “one” or similar language is used. Also, as used herein, the terms “has,” “have,” “having,” or the like are intended to be open-ended terms. Further, the phrase “based on” is intended to mean “based at least partially on” unless explicitly stated otherwise.

[0011] It will be apparent that systems and/or methods, described herein, can be implemented in different forms of hardware, software, or a combination of hardware and software. The actual specialized control hardware or software code used to implement these systems and/or methods is not limiting of the implementations. Thus, the operation and behavior of the systems and/or methods are described herein without reference to specific software code, it being understood that software and hardware can be designed to implement the systems and/or methods based on the description herein.

[0012] Some non-limiting embodiments or aspects are described herein in connection with thresholds. As used herein, satisfying a threshold may refer to a value being greater than the threshold, more than the threshold, higher than the threshold, greater than or equal to the threshold, less than the threshold, fewer than the threshold, lower than the threshold, less than or equal to the threshold, equal to the threshold, etc.

[0013] **Fig.1a** illustrates a block diagram of a system for implementing embodiments consistent with the present disclosure. In an embodiment, the exemplary environment 100 may include, without limiting to, a raw transactions 101 used to determine carbon foorprint, carbon offset tracking by Permanent Account Number (PAN) 103, rule engine 107, carbon alerting 109 and carbon offset purchase 111. The raw transactions 101 are associated with transactions for purchases, such as gas/petrol refill, airfare, trains fare, cruises, online shopping, in-person shopping, and so on. The carbon footprint is the total greenhouse gas emission caused by a product. Carbon footprint expressed as "carbon dioxide equivalent" say (CO2eq). Average user's cards has a carbon foorprint of about 150gCO2-eq. In an embodiment, a method for calculating a cardholder's carbon footprint based on transaction data in real time is disclosed. The method is performed by the system. Carbon footprint calculators are a type of eco-feedback technology that assists cardholders in understanding their environmental effect. Cardholders may determine their total carbon footprint, including direct and indirect greenhouse gas emissions, by inputting data about their lifestyle and living conditions into a calculator. Thereafter the method allows cardholders to define real time carbon criteria based on volume of usage of products, transportation, consumption of goods and services, and online or in-person shopping, with real time carbon offset tracking enabled by registered cardholder's Permanent Account Number (PAN) 103. The PAN level offset Data-Base (DB) storage 105 stores the cardholders PAN level and other card information which may required for validation, wherein cardholders PAN level is based on the carbon emission limit. Based on the rule engine 107, the method calculates the carbon footprint for transaction data in real time. The overall purchase should not exceed above the threshold value say more than 5 tons, wherein the threshold value is set by the cardholder. As an example, If cumulative CO > 5 tons in last month, purchase 5 tons of carbon offset. Where CO represents carbon. Furthermore, if the transaction exceeds the carbon emission limit, then the method activates carbon alerting 109 and determines the carbon offset purchase 111. The potential to offset carbon emissions and reduce aggregate carbon emissions may be available based on the transaction data, wherein

aggregation of carbon footprint analyzed based on purchases made in a day, a week, a month, and a year.

[0014] In an embodiment, the process of determing aggregate carbon footprint is shown in Fig. 1b. Fig. 1b discloses a payment gateway 113, real time transaction 115, a payment request 116, transaction processing system 119 and alert card holder 121. The transaction processing system 119 includes rule engine 107 and aggregate disctributed cache carbon footprint (PAN level) 117. Aggregate carbon footprints enables the issuer to retrieve the aggregate transaction footprints for the registered cardholder PAN based on the payment transaction. In an embodiment, the process comprises creating a PAN level cache which may be utilised for real-time transaction processing with rules to deny or approve transactions. In addition, if the cardholder's payments have surpassed specified criteria and/ or exceeded certain thresholds, real-time alerts may be sent to cardholders, with the option to approve or refuse future payments. Further, alert card holder 121 receives real-time warnings on aggregate carbon footprint to “issuers” Bank Identification Number (BIN) level for various products which encourage green behaviour. An issuer may commit to a particular quantity of carbon emissions at the product level. The initial set of four to six numbers that appear on a payment card is referred to as the BIN. This collection of digits identify the institution that issues the card and is essential in the process of matching transactions to the charge card's issuer.

[0015] In an embodiment, the present disclosures uses real time decisioning rule system and rules platform. The issuing bank may establish restrictions/ rules (for instance, the actual carbon emission may be provided by the card holder) which allows or refuses transaction based on carbon footprint. Alternatively, if specific criteria are exceeded, the transaction may accept or deny. As an example, if PAN level aggregation of carbon footprint > [1 tonne decline transaction], then the transaction is declined, wherein the carholder sets the PAN level aggregration. In addional to declined transaction, the cardholder receives alert message when PAN level aggregation of carbon footprint > [1 tonne decline transaction]. Furthermore, the user receives a feedback alert message that states for example "alert card holder request," and the cardholder may proceed to authorise additional transactions. In an embodiment, cardholder may assign a carbon footprint (cf) score, wherein carbon footprint score is generated via PAN level aggregation of real-time carbon usage. The various carbon footprint (cf) scores are if carbon footprint < 1 tonne, then cf score is 20-30, if carbon footprint is between 1 to 2 tonne,

then cf score is 30-40, if carbon footprint is between 3 to 4 tonne, then cf score is among 50-60, if carbon footprint is more than 5 tonne, then cf score is between 60-100.

[0016] As an example, the carbon footprint of the following purchases may be calculated: gas/fuel purchase, airfare, train fare, cruise (ballpark estimate), online shopping, and in-person shopping. For example, gas purchase transaction data may includes gas or fuel purhase details along with fuel price for that particular area based on the location, wherein location may be determined using zipcode.

Gas purchase/ gas price in zipcode X standard automobile mileage = carbon footprint

[0017] When it comes to airfare data, the server captures the start and end of each journey. By using number of miles travelled multiplied by an airplanes carbon emission an accurate carbon emission value/score is calculated.

Trip information distance from transaction (source to destination) X 1.6 = carbon footprint

[0018] Carbon footprint from train travel, for example, train price is regulated in each country and train fare price is calculated based on distance travelled by the user. Calculate carbon emissions by multiplying the distance travelled by the price of the ticket.

The calculation is purchase amount for (source – destination) x 1.6 = carbon footprint

[0019] Carbon foorprint from cruise data say 0.40 kilograms of carbon being emitted per user per kilometer.

The calculation is purchase amount for tickets x standard rate = carbon footprint

[0020] As an example, online shopping is based on Merchant Category Code (MCC), where in online shopping payment includes both average shipping charges and dollar amount for each merchant.

Carbon footprint = dollar amount X 1 X merchant category

[0021] Each merchant is categorized as general merchants (say 1), a high value but low carbon merchants (say 0.5), merchants enrolled in carbon neutral program don’t change the carbon score (say 0), high carbon merchants (say 1) and medium carbon merchants (say 2). In-person shopping is also based on MCC.

Carbon footprint = dollar amount X 1 X merchant category

[0022] wherein each merchant is categorized as general merchants (say 1) – total dollar amounts, high value but low carbon merchants (say 0.1), merchants enrolled in carbon neutral

program don't change the carbon score (say 0), high carbon merchants (say 5) and medium carbon merchants (say 2). For instance, a "GreenScore" can be tracked overtime based on trend analysis for particular user/ cardholder on aggregate carbon footprint, wherein aggregation of carbon footprint analyzed based on purchase made in a day, or a week, or a month, or a year. Thereafter greenscore is obtained from standard deviation of daily or weekly carbon emission from the trend analysis. If cardholder's greenscore exceeds a threshold value, then carbon alert is activated at the point of purchase. The greenscore may be acquired for visits to restaurants, purchases of groceries, transport such as air travel or train travel, gas refill/purchase, online shopping, and in-person shopping.

[0023] **Fig. 2** shows a flowchart illustrating a process for determining cardholder's carbon footprint based on transaction data. **At block 201**, the method comprises determining a cardholders carbon offset tracking based on transaction data by utilizing Permanent Account Number (PAN). For example, a purchase may be done in store (in-person shopping) or online shopping by using card. **At block 203**, the method comprises applying threshold value for carbon footprint set by the user, wherein a carbon threshold value depending on volume and purchase is established. Once the purchase is completed, system receives the request to verifies the card, account, PAN, availabity of balance amount and also checks the cabon limit. **At block 205**, decision is made based on rules which allows cardholders to continue transaction in real-time. Thereafter, alerting the user based on the determined carbon emission **at block 207**. In an embodiment the activation of alert is based on threshold set by the user. If the purchase exceeds the carbon threshold value/ or greenscore, the carbon emission warning will be activated. **At block 209**, the process includes verifying carbon offset emission purchase and reducing total carbon emissions. In one embodiment, apart from providing alerts, recommendations to buy green products may also be provided to compensate for the carbon emissions.

[0024] Computer System

[0025] **Fig. 3** illustrates a block diagram of an exemplary computer system for implementing embodiments consistent with the present disclosure.

[0026] In an embodiment, the computer system 300 may be used to implement the system. The computer system 300 may include a central processing unit ("CPU" or "processor") 302. The processor 302 may include at least one data processor for performing accessible data

visualization on a web platform. The processor 302 may include specialized processing units such as, integrated system (bus) controllers, memory management control units, floating point units, graphics processing units, digital signal processing units, etc.

[0027] The processor 302 may be disposed in communication with one or more input/output (I/O) devices (312 and 313) via I/O interface 301. The I/O interface 301 employ communication protocols/methods such as, without limitation, audio, analog, digital, monoaural, radio corporation of America (RCA) connector, stereo, IEEE-1394 high speed serial bus, serial bus, universal serial bus (USB), infrared, personal system/2 (PS/2) port, bayonet neill-concelman (BNC) connector, coaxial, component, composite, digital visual interface (DVI), high-definition multimedia interface (HDMI), radio frequency (RF) antennas, S-Video, video graphics array (VGA), IEEE 802.11b/g/n/x, Bluetooth, cellular e.g., code-division multiple access (CDMA), high-speed packet access (HSPA+), global system for mobile communications (GSM), long-term evolution (LTE), worldwide interoperability for microwave access (WiMax), or the like, etc.

[0028] Using the I/O interface 301, the computer system 300 may communicate with one or more I/O devices such as input devices 312 and output devices 313. For example, the input devices 312 may be an antenna, keyboard, mouse, joystick, (infrared) remote control, camera, card reader, fax machine, dongle, biometric reader, microphone, touch screen, touchpad, trackball, stylus, scanner, storage device, transceiver, video device/source, etc. The output devices 313 may be a printer, fax machine, video display (e.g., cathode ray tube (CRT), liquid crystal display (LCD), light-emitting diode (LED), plasma, plasma display panel (PDP), organic light-emitting diode display (OLED) or the like), audio speaker, etc.

[0029] In some embodiments, the processor 302 may be disposed in communication with a communication network 309 via a network interface 303. The network interface 303 may communicate with the communication network 309. The network interface 303 may employ connection protocols including, without limitation, direct connect, ethernet (e.g., twisted pair 10/100/1000 Base T), transmission control protocol/internet protocol (TCP/IP), token ring, IEEE 802.11a/b/g/n/x, etc. The communication network 309 may include, without limitation, a direct interconnection, local area network (LAN), wide area network (WAN), wireless network (e.g., using Wireless Application Protocol), the Internet, etc. Using the network interface 303 and the communication network 309, the computer system 300 may communicate with a database 314, which may be the enrolled templates database 313. The network interface

303 may employ connection protocols include, but not limited to, direct connect, ethernet (e.g., twisted pair 10/100/1000 Base T), transmission control protocol/internet protocol (TCP/IP), token ring, IEEE 802.11a/b/g/n/x, etc.

[0030] The communication network 309 includes, but is not limited to, a direct interconnection, a peer to peer (P2P) network, local area network (LAN), wide area network (WAN), wireless network (e.g., using Wireless Application Protocol), the Internet, Wi-Fi and such. The communication network 309 may either be a dedicated network or a shared network, which represents an association of the different types of networks that use a variety of protocols, for example, hypertext transfer protocol (HTTP), transmission control protocol/internet protocol (TCP/IP), wireless application protocol (WAP), etc., to communicate with each other. Further, the communication network 309 may include a variety of network devices, including routers, bridges, servers, computing devices, storage devices, etc.

[0031] In some embodiments, the processor 302 may be disposed in communication with a memory 305 (e.g., RAM, ROM, etc. not shown in FIGURE 3) via a storage interface 304. The storage interface 304 may connect to memory 305 including, without limitation, memory drives, removable disc drives, etc., employing connection protocols such as, serial advanced technology attachment (SATA), integrated drive electronics (IDE), IEEE-1394, universal serial bus (USB), fiber channel, small computer systems interface (SCSI), etc. The memory drives may further include a drum, magnetic disc drive, magneto-optical drive, optical drive, redundant array of independent discs (RAID), solid-state memory devices, solid-state drives, etc.

[0032] The memory 305 may store a collection of program or database components, including, without limitation, user interface 306, an operating system 307, etc. In some embodiments, computer system 300 may store user/application data, such as, the data, variables, records, etc., as described in this disclosure. Such databases may be implemented as fault-tolerant, relational, scalable, secure databases such as Oracle or Sybase.

[0033] The operating system 307 may facilitate resource management and operation of the computer system 300. Examples of operating systems include, without limitation, Apple™ Macintosh ™ OS X™, UNIX™, Unix-like system distributions (e.g., Berkeley Software Distribution (BSD), FreeBSD™, Net BSD™, Open BSD™, etc.), Linux distributions (e.g., Red Hat™, Ubuntu™, K-Ubuntu™, etc.), International Business Machines (IBM™) OS/2™,

Microsoft Windows™ (XP™, Vista/7/8, etc.), Apple iOS™, Google Android™, Blackberry™ operating system (OS), or the like. In some embodiments, the computer system 300 may implement web browser 308 stored program components. Web browser 308 may be a hypertext viewing application, such as Microsoft™ Internet Explorer™, Google Chrome™, Mozilla Firefox™, Apple™ Safari™, etc. Secure web browsing may be provided using secure hypertext transport protocol (HTTPS), secure sockets layer (SSL), transport layer security (TLS), etc. Web browsers 308 may utilize facilities such as AJAX, DHTML, Adobe™ Flash, Javascript, Application Programming Interfaces (APIs), etc.

[0034] According to some non-limiting embodiments or aspects, a computer program product including at least one non-transitory computer-readable medium including one or more instructions.

[0035] The illustrated steps are set out to explain the exemplary embodiments shown, and it should be anticipated that ongoing technological development will change the manner in which particular functions are performed. These examples are presented herein for purposes of illustration, and not limitation. Further, the boundaries of the functional building blocks have been arbitrarily defined herein for the convenience of the description. Alternative boundaries can be defined so long as the specified functions and relationships thereof are appropriately performed. Alternatives (including equivalents, extensions, variations, deviations, etc., of those described herein) will be apparent to persons skilled in the relevant art(s) based on the teachings contained herein. Such alternatives fall within the scope and spirit of the disclosed embodiments. Also, the words "comprising," "having," "containing," and "including," and other similar forms are intended to be equivalent in meaning and be open ended in that an item or items following any one of these words is not meant to be an exhaustive listing of such item or items, or meant to be limited to only the listed item or items. It must also be noted that as used herein, the singular forms “a,” “an,” and “the” include plural references unless the context clearly dictates otherwise.

[0036] Furthermore, one or more computer-readable storage media may be utilized in implementing embodiments consistent with the present disclosure. A computer readable storage medium refers to any type of physical memory on which information or data readable by a processor may be stored. Thus, a computer readable storage medium may store instructions for execution by one or more processors, including instructions for causing the processor(s) to perform steps or stages consistent with the embodiments described herein. The

term “computer readable medium” should be understood to include tangible items and exclude carrier waves and transient signals, i.e., are non-transitory. Examples include random access memory (RAM), read-only memory (ROM), volatile memory, non-volatile memory, hard drives, CD ROMs, DVDs, flash drives, disks, and any other known physical storage media.

[0037] Finally, the language used in the specification has been principally selected for readability and instructional purposes, and it may not have been selected to delineate or circumscribe the inventive subject matter. Accordingly, the disclosure of the embodiments of the disclosure is intended to be illustrative, but not limiting, of the scope of the disclosure.

SYSTEM AND METHOD FOR ALERTING AND DECISIONING CARBON FOOTPRINT IN REAL TIME BASED ON TRANSACTION DATA

ABSTRACT

The present disclosure relates to real time carbon footprint alerting and decisioning method and system based on transaction data. The present invention uses transaction data to determine cardholder's carbon footprint. Thereafter the method enables cardholders to define carbon thresholds. Each threshold value is set by the user based on volume and purchase. Further, cardholders may decide whether to be alerted, or the method may decide for users. The proposed invention provides a solution by determining carbon foot print for each Permanent Account Number (PAN) using transaction data and providing dynamic alerting and automated carbon offset purchasing. The present disclosure provides a solution for rewards based on carbon footprint analysis and may automatically buy carbon offset point.

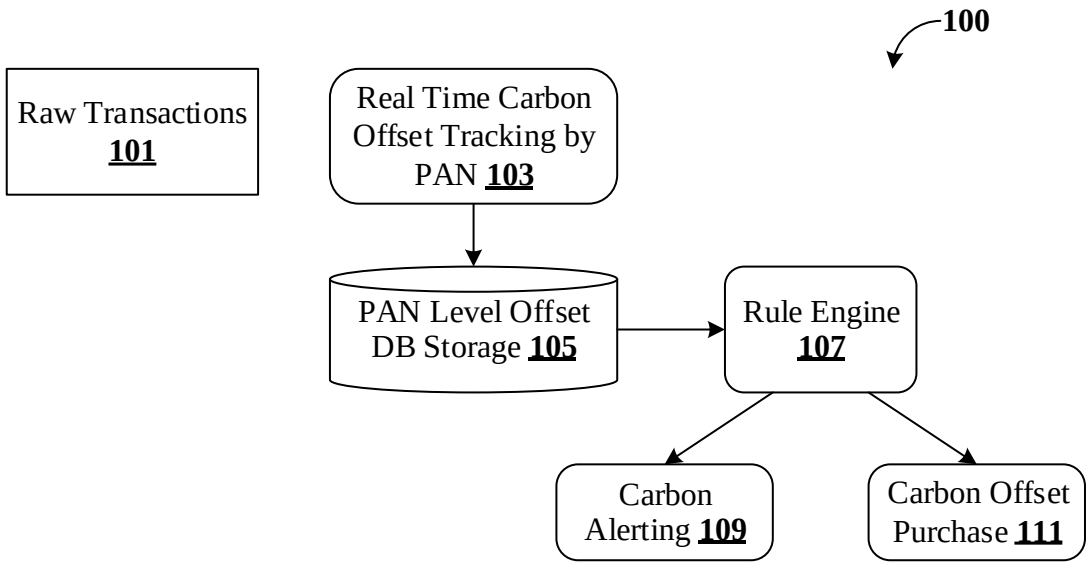
100
Raw Transactions 101
Real Time Carbon Offset Tracking by PAN 103
PAN Level Offset DB Storage 105
Rule Engine 107
Carbon Alerting 109
Carbon Offset Purchase 111

Fig. 1a

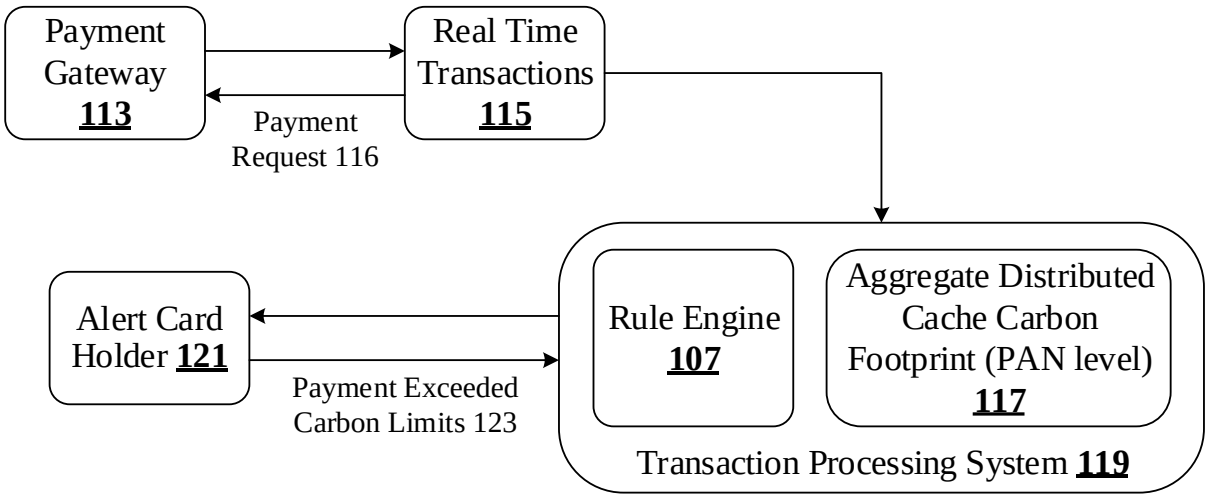
Payment Gateway 113
Real Time Transactions 115
Payment Request 116
Alert Card Holder 121
Payment Exceeded Carbon Limits 123
Rule Engine 107
Aggregate Distributed Cache Carbon Footprint (PAN level) 117
Transaction Processing System 119

Fig. 1b

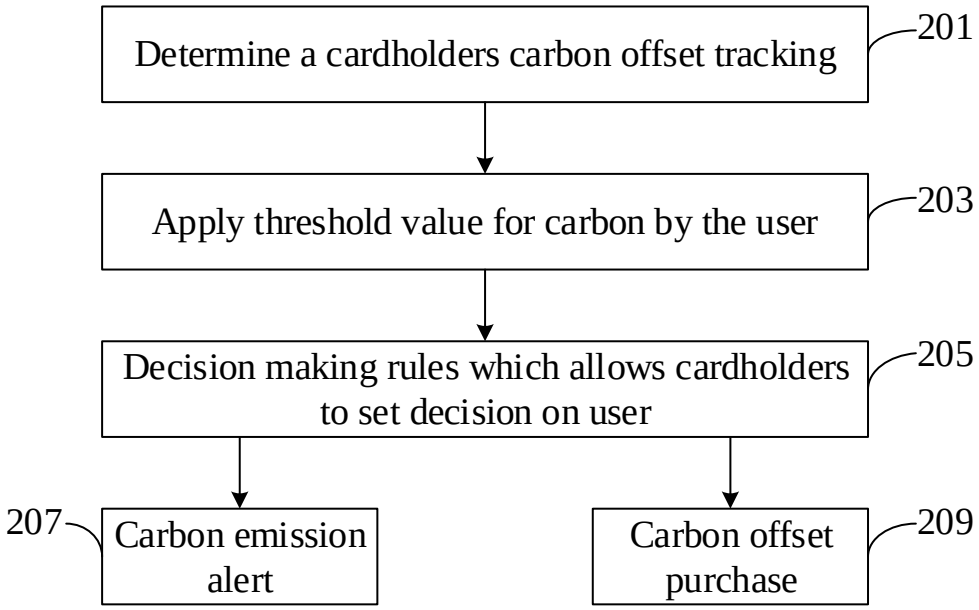
Determine a cardholders carbon offset tracking
201
Apply threshold value for carbon by the user
203
Decision making rules which allows cardholders to set decision on user
205
207
Carbon emission alert
Carbon offset purchase
209

Fig. 2

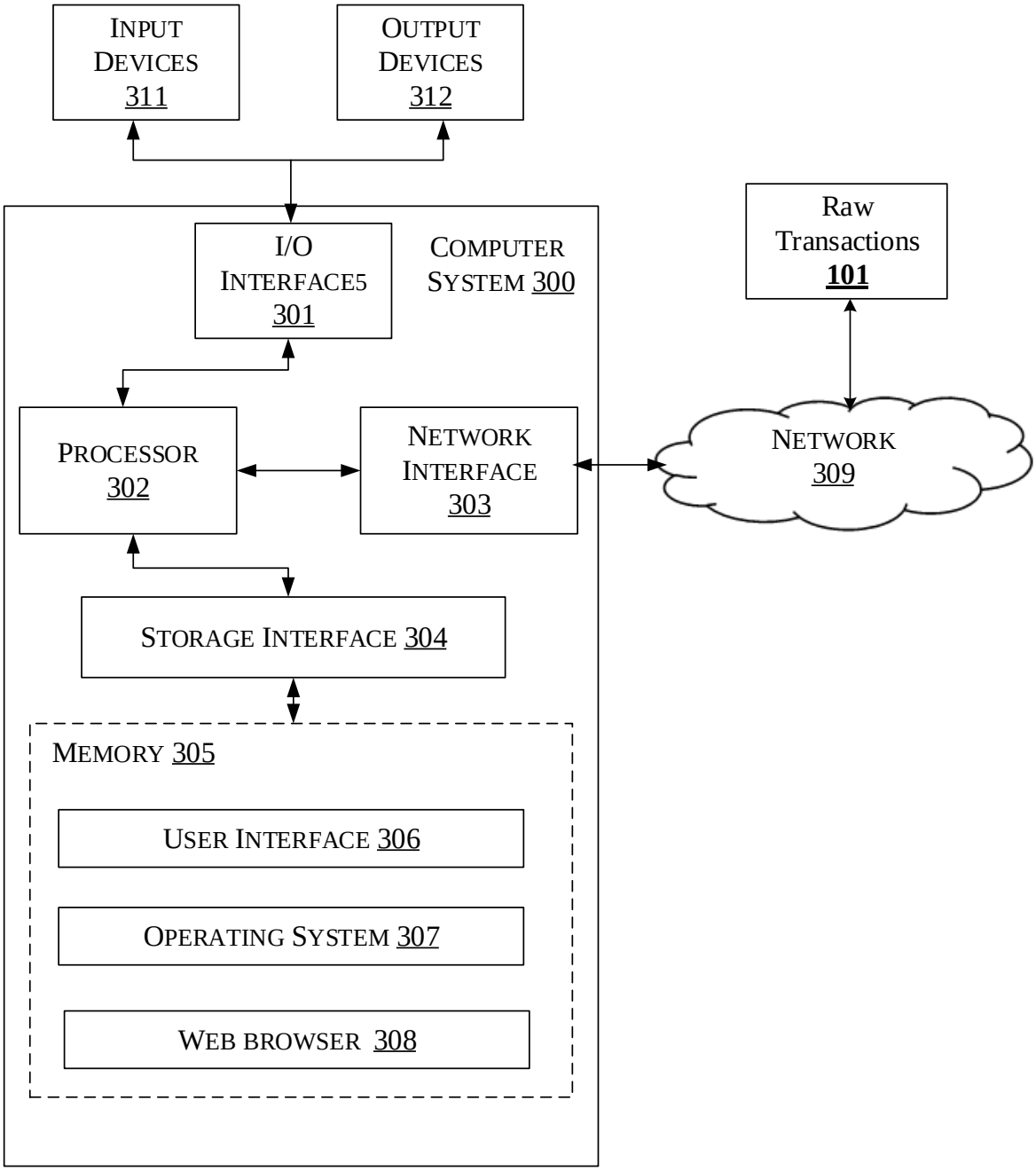
INPUT DEVICES 311
OUTPUT DEVICES 312
I/O INTERFACE5 301
COMPUTER SYSTEM 300
Raw Transactions 101
PROCESSOR 302
NETWORK INTERFACE 303
NETWORK 309
STORAGE INTERFACE 304
MEMORY 305
USER INTERFACE 306
OPERATING SYSTEM 307
WEB BROWSER 308

Fig. 3